

remarks that the scientific zeal and liberality of M. Bischoffsheim "inaugurates in France a path long followed in England by wealthy amateurs of astronomy."

THE METEORITE OF JUNE 14, 1877.—M. Gruey has calculated the orbit of this meteorite with the assistance of the Observatory of the Puy-de-Dôme, and accounts obtained through the press of Clermont, where he observed it at 8h. 55m. P.M. local time. Observations made at Bordeaux and at Angoulême were combined with those at Clermont. He obtained for the velocity of the meteor relatively to the sun 93 kilometres in a second, in the direction — heliocentric longitude  $15^{\circ} 17'$ , latitude —  $17^{\circ} 3'$ , and neglecting the insignificant effect of the earth's attraction upon a velocity so great, and the unknown effect of atmospheric resistance, he found for the heliocentric motion of the meteor the following elements of a hyperbolic orbit. Eccentricity,  $7.079$ , semi-axis,  $0.137$ . Ascending node,  $83^{\circ} 49'$ , inclination,  $18^{\circ} 14'$ , perihelion from node,  $286^{\circ} 50'$ , longitude at appearance,  $263^{\circ} 49'$ ; the meteor approaching its perihelion was thus distant  $23^{\circ}$  from it.

This adds another case to several previous ones in which hyperbolic orbits have been obtained for meteorites by Petit, Galle, Tissot, &c.

PROF. NEWCOMB.—At the meeting of the Royal Society on Thursday last, the distinguished mathematical astronomer, Prof. Simon Newcomb, of Washington, was elected one of its foreign members. There was previously on the list only a single American, viz., Prof. Asa Gray. Prof. Newcomb's important contributions to astronomical science will be admitted to have richly entitled him to an acknowledgment at the hands of our leading society.

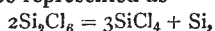
### CHEMICAL NOTES

MINERAL OIL IN A LAVA OF MOUNT ETNA.—In the basaltic zone which reaches from the foot of Mount Etna in a south-south-easterly direction, near the village of Paterno there is a prehistoric doleritic lava containing olivine, which surrounds the clay deposits of a mud volcano and which has been examined by Sig. Orazio Silvestri. Under the microscope the lava shows an augitic principal mass with a quantity of olivine and many white transparent crystals of labradorite. The lava contains numerous round or irregular cavities which are coated with arragonite and which are filled with mineral oil. This oil, of which there is about 1 per cent. by weight in the whole mass, was taken from one of the cavities at  $24^{\circ}$  C. At about  $17^{\circ}$  C. it begins to solidify and is of a yellowish green tint by transmitted light, while by reflected light it is opalescent and light green. Chemical analysis of the liquid proved it to contain:—

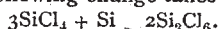
Liquid hydrocarbons (boiling point $79^{\circ}28$ )	...	17.97 per cent.
Hydrocarbons solidifying under $0^{\circ}$ (b. p. $280^{\circ}$ — $400^{\circ}$ )	...	31.95 " "
Paraffine, melting point $52^{\circ}$ – $57^{\circ}$	...	42.79 " "
Asphalt (leaving 12 per cent. of ashes)	...	2.90 " "
Sulphur	...	4.32 " "

99.93

FORMATION OF CERTAIN BODIES AT TEMPERATURES ABOVE THAT OF THEIR DECOMPOSITION.—MM. Troost and Hautefeuille have lately demonstrated that under certain circumstances it is incorrect to suppose that bodies undergoing decomposition or rather dissociation at a low temperature may not exist as definite compounds at higher temperatures. Their arguments are founded on the decomposition of silicon sesquichloride ( $\text{Si}_2\text{Cl}_6$ ) at  $800^{\circ}$ , which may be represented as—



if, however, the reaction be carried on at a temperature above  $1200^{\circ}$  the following change takes place—



If the tube in which this reaction takes place be cooled suddenly the sesquichloride is found, but if cooled slowly it undergoes gradual decomposition. They also find that although ozone is converted into oxygen at  $250^{\circ}$ , if a silver tube inclosed in a porcelain tube be kept at about  $1300^{\circ}$  a deposit of dioxide of silver is produced due to the formation of ozone. They state that the ozone can be recognised by the usual tests if the gas be rapidly drawn off and quickly cooled. They have also examined certain similar phenomena in the production of oxide of silver at  $1400^{\circ}$ .

IODATES OF COBALT AND NICKEL.—Prof. F. W. Clarke describes these salts, which were prepared by dissolving the carbonates in aqueous iodic acid, and allowing the solution to evaporate spontaneously when salts of the composition  $\text{CoI}_2\text{O}_6.6\text{H}_2\text{O}$  and  $\text{NiI}_2\text{O}_6.6\text{H}_2\text{O}$  crystallise out. If the solution of the carbonate of cobalt in iodic acid is evaporated rapidly, then the iodate of Rammelsberg, containing  $1\frac{1}{2}$  molecules of water may be obtained, but not otherwise. The cobalt iodate loses four molecules of water at  $100^{\circ}$ , but the remaining two molecules cannot be driven off without partial decomposition of the salt. The specific gravities of the two salts are almost identical, the cobalt iodate at  $21^{\circ}$  being 3.6893, the nickel iodate at  $22^{\circ}$  being 3.6954. No numbers of the solubilities of the two salts are given by Prof. Clarke, but these, when obtained, will be of some interest.

ORIGIN AND FORMATION OF BORACIC ACID.—M. Dieulafoy (*Comp. Rend.* lxxxv. 605) finds that under certain conditions by spectrum analysis  $1.000\frac{25}{1000}$  grammes of boron, and by the colour imparted to a hydrogen flame  $1.000\frac{75}{1000}$  grammes may be detected. He considers boracic acid to be a normal constituent of sea-water and salt marshes lying above beds of carnallite. M. Dieulafoy finds that this acid may be recognised in a drop of sea-water weighing about  $0.0378$  grammes, and that the minimum quantity found in the Mediterranean is two decigrammes per cubic metre of water. He arrives by geological reasoning at conclusions differing from those of Dumas and others with regard to the origin of this body in the lagoons of Tuscany, and thinks that the source of boracic acid in this district may be found in a relatively modern formation.

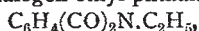
NEW MODES OF FORMING ETHYLEN OXIDE.—In the *Comptes Rendus*, lxxxv. 624, Mr. H. Greene mentions the results of experiments on the action of certain metallic oxides on the bromide, iodide, and chloriodide of ethylene. Oxide of silver has a rapid action on ethylene iodide at a temperature of  $150^{\circ}$ , forming ethylene oxide; its action on ethylene bromide produces the same result but requires a higher temperature. Ethylene bromide and chloriodide both act upon sodium oxide at  $180^{\circ}$ , the latter of the ethylene compounds being the one found most advantageous by the author in preparing ethylene oxide. He has also studied the action of these substances on the oxides of the diatomic metals barium and lead. These oxides do not give ethylene oxide when heated with bromide or chloriodide of ethylene. These experiments show, on the one hand, the analogy between the silver and sodium oxides confirmed by the isomorphism of their anhydrous sulphates and chlorides, and on the other their difference from the group of diatomic oxides.

THE ACTION OF CERTAIN ANTISEPTIC VAPOURS ON THE RIPENING OF FRUITS.—MM. Lechartier and Belamy give an account in the *Comptes Rendus*, lxxxiv. 1,035, of some experiments they made on the fermentation of apples when inclosed in vapours such as carbolic acid, camphor, and potassium cyanide. From their results it appears that no fermenting action took place in the apples surrounded by vapour of carbolic or hydrocyanic acids, and a slight action only in the one surrounded by camphor vapour. The camphor vapour, in fact, diminishes without entirely destroying the vitality of the cells. In this journal, also, there is an account of

experiments performed in the same direction by M. Gayon. He incloses the apples in vapours of chloroform, ether, and carbon disulphide, and his results agree with those of the first observers. The chloroform and ether act in the same manner as the carbolic and hydrocyanic acids; the carbon disulphide in the same way as camphor, permitting partial fermentation only.

**A PROBLEM IN CHEMICAL AFFINITY.**—In his work on "Gasometric Methods," Prof. Bunsen details an interesting series of experiments on the phenomena accompanying the explosion of hydrogen and carbon monoxide with a volume of oxygen insufficient for its complete combustion. From the results he deduces the conclusion that the ratio between the products of combustion ( $H_2O : CO_2$ ) can always be expressed by *small whole numbers* (1:2, 1:3, 1:4, &c.), and that it alters suddenly from one figure to the next by gradually increasing the amount of hydrogen. Deeming the nine experiments upon which the conclusion was based as insufficient for the establishment of a general principle, Prof. Horstmann, of Heidelberg, describes in the *Verhandlungen des heidelb. naturf. med. Vereins*, an extensive series of observations designed to test the truth of the law. Among his results the following facts are of interest. In exploding CO with gradually increasing quantities of  $H_2 + O$ , while the ratio between H and CO increased from 0.25:1 to 2.33:1, the ratio between  $H_2O$  and  $CO_2$  gradually increased from 0.8:1 to 4.5:1, with no evidence of a predilection for rational numbers. Experiments on a mixture of CO and H, with gradually increasing amounts of O, led to the same results, showing no such regularity in the division of O between the two combustible gases as Bunsen's law would indicate. When aqueous vapour is present in the mixture less H and more CO unites with O, while the presence of  $CO_2$  reverses the case. By gradually increasing the amount of O in the explosive mixture, it was noticed that the ratio between the resultant  $H_2O$  and  $CO_2$  increased until it attained a maximum, when 35 per cent. of the combustible gases were oxidised, and then sank regularly to the ratio denoting complete combustion. The oxygen appears to be divided among the two gases according to the following law:—The ratio between the resultant  $H_2O$  and  $CO_2$  is equal to the ratio between the residual H and CO multiplied by a co-efficient of affinity which is independent of the ratio between the combustible gases but dependent on the relative quantity of O present. This co-efficient of affinity varied between 4 and 64, showing that always more H relatively than CO is consumed, and hence that the affinity of O to H is greater than that to CO.

**HALOGEN DERIVATIVES OF AMINES.**—An attempt has frequently been made by chemists to replace the hydrogen in the hydrocarbon group present in amines, by Cl, Br, or I. These efforts have hitherto resulted simply in the substitution of the basic H atoms of the amine by halogens—as  $C_2H_5.NCl_2$ —or in complete decomposition. A. Michael (*Berl. Ber.*, x., 1644) has devised a method for accomplishing this end, which consists in first replacing these basic H atoms by acid residues, and then exposing to the action of a halogen ethyl-phthalimide,



yields in this way with Br a tribromo-ethyl-phthalimide.

**DOUBLE SALTS WITH CYANIDE OF GOLD.**—C. G. Lindbom publishes in the *Univ. Arsskrift* of Lund an exhaustive account of these compounds, which may be regarded as salts of the two acids,  $HCy.CyAu$  and  $HCy.CyAu.Cy_2 + 1\frac{1}{2}aq.$ , neither of which, however, can be obtained pure for analysis on account of their tendency to decompose. Most of the auro salts unite directly with a molecule of the halogens; for example aurocyanide of sodium,  $NaCy_2Au$ , forms bromo-aurocyanide of sodium,  $NaCy_2AuBr_2 + 2aq.$  Aurocyanide of ammonium,  $AmCy_2Au$ , is decomposed at 100°.

**THE FOURTH NITROBENZOIC ACID.**—Prof. F. Fittica has discovered lately a new nitro-benzoic acid, making the fourth of the isomeric acids, which has been contested by other chemists, especially as it fails altogether to harmonise with the theories at present accepted in regard to the structure of benzene derivatives. In the October session of the Deutsche chemische Gesellschaft, he strengthens his position by announcing the discovery of a fourth nitro-benzaldehyde, obtained by the action of  $H_2SO_4$  on benzaldehyde and ethylic nitrate, which on oxidation is changed into the new nitrobenzoic acid,  $C_6H_4.NO_2.COOH$ .

**INFLUENCE OF ISOMERISM ON THE FORMATION OF ETHERS BETWEEN ACIDS AND ALCOHOLS.**—In the September session of the Russian Chemical Society, Prof. H. N. Menshutkin presented an elaborate paper on this subject based on observations of the formation of acetic ethers. The process consisted in inclosing molecular weights of an alcohol and acetic acid in glass tubes, immersing it in a glycerine bath at 154° for a certain time, and then rapidly cooling it, and titrating the unaffected acetic acid with baryta water. The results show that in regard to the rapidity and limits of etherification, the primary alcohols are sharply divided from the secondary, and the latter from the tertiary; and the saturated alcohols from the non-saturated. A regular decrease in the rapidity coincides with an increase in the molecular weight of the alcohol. As in many other series of experiments, methylic alcohol shows considerable deviations from the laws governing its higher homologues. In the case of non-saturated alcohols the rapidity is less than that of the corresponding primary alcohols, but greater than that of the corresponding secondary alcohols.

**PHOSPHIDES OF TIN.**—Since the introduction of phosphorus bronze, the compounds of phosphorus and the metals are receiving more attention. S. Natanson and G. Vortmenn describe (*Berl. Ber.*, x. 1459), several methods of preparing phosphides of tin, viz., throwing P on molten tin, melting a mixture of vitreous phosphoric acid, charcoal, and tin, and passing phosphorus vapours over molten tin in a hydrogen stream. These processes all yield a crystalline silvery white compound, containing from  $\frac{1}{10}$  to 3 per cent. of P, and leaving on treatment with HCl a residue of pure SnP.

**CHEMICAL ACTION OF LIGHT.**—In a late number of the *Annales de Chimie et Physique*, M. Chastaing advances, in connection with a variety of observations on this topic, the theory that the chemical action of the various coloured rays on inorganic substances is dependent on refrangibility, blue and violet acting as reducing agents, red and yellow causing oxidation. Prof. H. W. Vogel attacks this opinion vigorously in the last session of the German Chemical Society, claiming that the nature of the substance causes the action to be one of reduction or oxidation. The union of H and Cl, which takes place so rapidly in violet light, is regarded as purely analogous to oxidation, and he alludes to Timiriazeff's late experiments, showing that the reduction of  $CO_2$  by plants, proceeds more rapidly in red light than in green.

## NOTES

At the meeting of the Royal Society, on Thursday last, the *Times* states, the following were elected foreign members:—Marcellin Berthelot, of Paris; Joseph Decaisne, of Paris; Emil Dubois Reymond, of Berlin; Adolph Wilhelm Hermann Kolbe, of Leipsic; Rudolph Leuckart, of Leipsic; Simon Newcomb, of Washington; and Pafnutij Tscheytschow, of St. Petersburg. By this election the foreign list of the society is made up to its full complement of fifty members.

MR. ALEXANDER AGASSIZ, it is understood, proposes to spend the winter in the prosecution of scientific research in the Florida